MULTIMEDIA

SECTION 1

a) **Introduction**

questions to be asked and discussed

1) What is multimedia?
2) What media are meant in the term 'multimedia'?
3) What is still/animated image?
4) What combinations of 'text', 'sound', 'video' and 'image' can be considered as 'multimedia'?
5) What is the difference between 'multimedia' and 'motion pictures'?
6) What interactive elements in multimedia can you suggest?

Exercise 1

Match the multimedia terms to the activities. More than one match is possible.

MIDI	Watching movies
MP3	Composing music on a PC
DVD	Downloading music from the Internet
MPEG	Using reference works like encyclopedias

b) **Compression**

questions to be asked and discussed

1) What is compression?
2) What kinds of data can be compressed? What kinds of compression do you know?
3) Text (content) compression
4) What is decompression?
5) Lossy and lossless compression.

c) **Digitization**

questions to be asked and discussed

1) Digitization
2) Analog and digital signals

report

Converting analog signals into digital signals

Where digitization can be used

SECTION 2 **Audio formats**

a) MP3

report

history of MP3

Exercise 2

Read the text and answer the questions.

The name comes from MPEG (pronounced EM-peg), which stands for the Motion Picture Experts Group. MPEG develops standards for audio and video compression. MP3 is actually MPEG Audio Layer 3.

MP3 competes with another audio file format called WAV. The key difference is that MP3 files are much smaller than WAV files. An MP3 file can store a minute of sound per megabyte, while a WAV file needs 11 or 12 megabytes to hold the same amount. How does MP3 achieve this compression? CDs and audio files don't reproduce every sound of a performance. Instead, they sample the performance and store a discrete code for each sampled note. A CD or WAV file may sample a song 44,000 times a second, creating a huge mass of information.

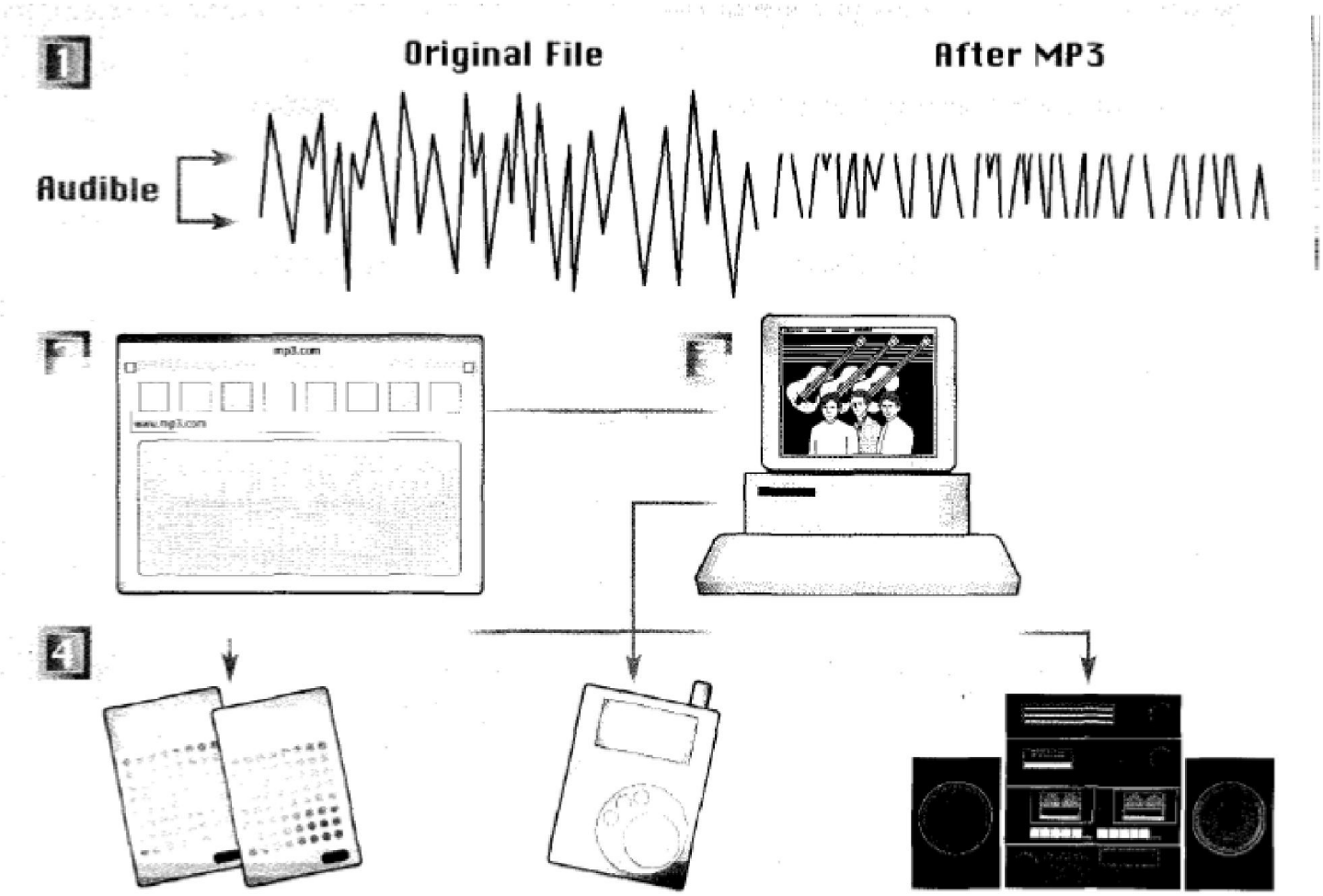
By stripping out sounds most people can't hear, MP3 significantly reduces the information stored. For instance, most people can't hear notes above a frequency of 16kHz, so it eliminates them from the mix. Similarly, it eliminates quiet sounds masked by noise at the same frequency. The result is a file that sounds very similar to a CD, but which is much smaller. An MP3 file can contain spoken word performances, such as radio shows or audio books, as well as music. It can provide information about itself in a coded block called a tag. The tag may include the performer's name, a graphic such as an album cover, the song's lyrics, the musical genre, and a URL for more details.

1 What does MP3 stand for?
2 What is the difference between MP3 and WAV files?
3 What kind of sound does MP3 strip out?
4 What kind of information is included in the tag?

Exercise 3

Study this diagram which explains MP3. Answer the questions.

1 How does MP3 reduce the size of music files?
2 What can you obtain from www.mp3.com?
3 How can you listen to MP3 files?



Exercise 4

Match these captions to the pictures in Exercise 3. Consider again your answers.

a Once you've paid by credit card (unless it's one of the millions of free files), music is downloaded to your PC.

b The original music file is stripped of anything that is inaudible to the human ear. After MP3 has done its work, the file is reduced to roughly one twelfth that of the original recording.

c MP3 files can be listened to on your PC, a dedicated MP3 player, or your hi-fi.

d MP3 files are put on a website, where browsers can listen to samples and buy a single track or album ... or even create their own compilation.

Exercise 5

Read the text and find answers to the questions.

1 How do you play MP3 files?
2 What does the Windows Media Player file do with an MP3 file?
3 What is a standalone player?
4 What special features can players offer?
5 What information can you obtain by clicking on the track info button?
6 What does a skin enable you to do?
7 How do you play music from a CD-ROM on an MP3 player?
8 What hardware and software do you need to make your own audio CDs?

Play MP3 Files

Most machines today have enough processing power and memory to play MP3s immediately. Simply download an MP3 file like any other and click on it in Windows Explorer. The Windows Media Player will decode the file and route the signals to your soundcard and then to your speakers.

Other MP3 features include:

Players.

Most standalone players have many features beyond Windows' default Media Player. To control what music you play, players let you group songs into playlists and randomize the selections. To control how the music sounds, they offer spectrum analyzers, graphic equalizers, and frequency displays.

Track info.

A track info button gives you the information on the MP3 file's tag. Other buttons may take you to a music library where you can organize your MP3 files by performer or genre.

Skins or themes.

These programs are designed to change the appearance of the most popular players. They're akin to the wallpaper that alters the look of the Windows desktop. With a skin, a player can become a jukebox, a car dashboard, or a Star Trek tricorder. Think of them as easily interchangeable faceplates.

Rippers and encoders.

A ripper is a program that rips songs from a CD in your CD-ROM drive and turns them into WAV files. An encoder converts WAV files into MP3 files or vice versa. Many MP3 players incorporate rippers and encoders and can do both steps in one.

Recorders.

With a writeable CD-ROM drive, a recorder program lets you create your own audio CDs.

Exercise 6

Match causes and effects. Link them with an -ing-clause

Cause	Effect
1 Computers with MIDI interface boards can be connected to MIDI instruments.	a This permits extra information to be stored on the performer and other track details.
2 Each side of a DVD can have two layers.	b You can create your own compilation.
3 MP3 removes sounds we can't hear.	c This allows you to sample a new group before buying their CD.
4 You can download single tracks.	d This gives an enormous storage capacity.
5 Each MP3 file has a tag.	e This allows the music being played to be stored by the computer and displayed on the monitor.
6 MP3 players contain several devices.	f This enables you to change the appearance of your player.
7 You can download a skin program.	g These allow you to control the way the music sounds.
8 You can legally download some music.	h This produces much smaller files.

Exercise 7

Explain how these actions are performed.

1 MP3 reduces the information stored.
2 You can alter the look of your MP3 player.
3 You can 'rip' the audio information from a CD.
4 You can convert a WAV file to MP3 format.
5 You can view the lyrics, notes and author data.
6 You can control how the music sounds.
7 You can access many free and legal music files for downloading.
8 You can play MP3 files through your sound system.

b) <u>other audio formats</u>

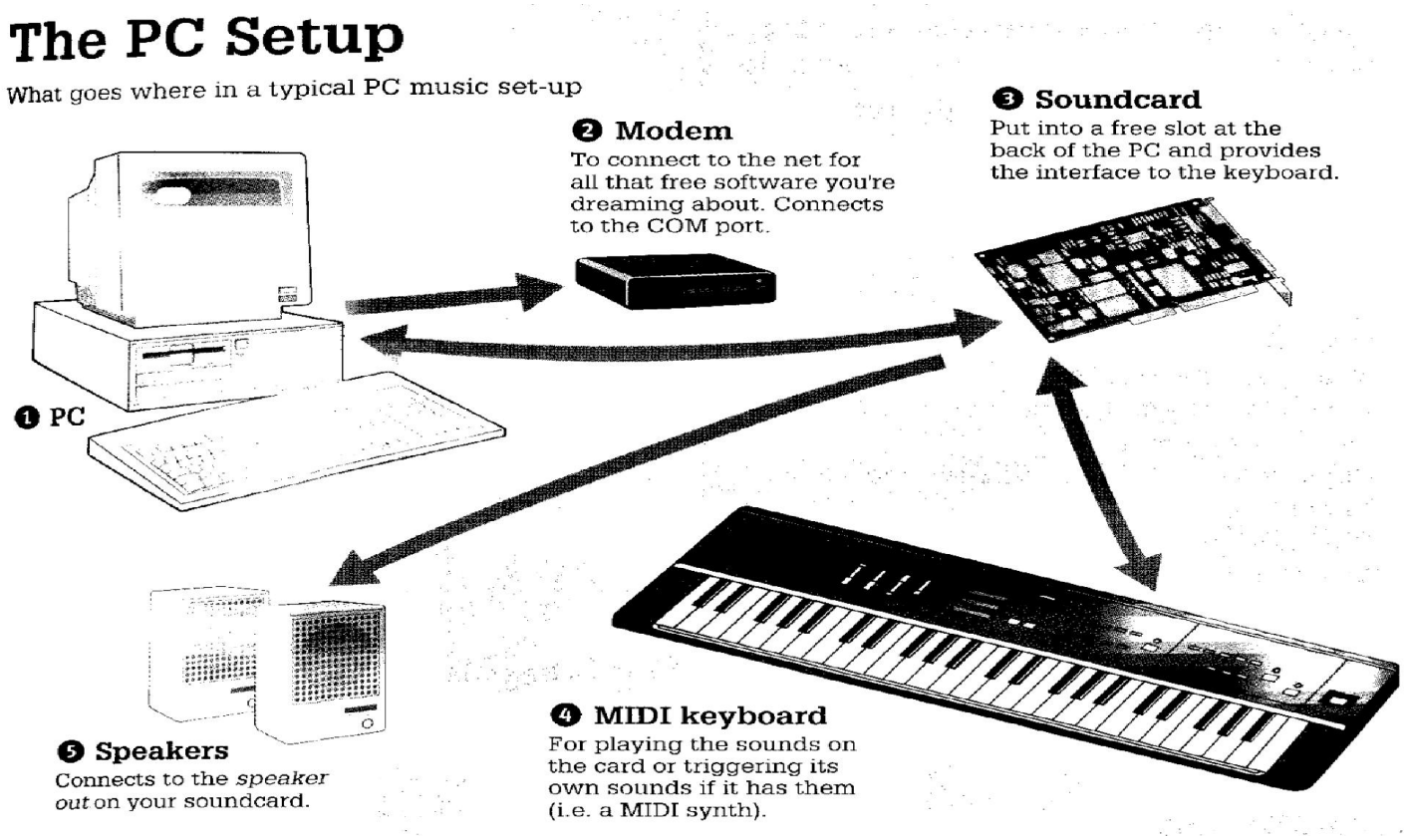
questions to be asked and discussed

1) What other audio formats do you know?
2) What compression algorithms are used in audio formats?
3) WAV format
4) MIDI

Audio formats: used for different purposes

Exercise 8

Study the diagram which illustrates how MIDI operates. Link each set of sentences into one complex sentence to form a continuous paragraph. You may add, change or omit words.



1 Most modern music is mixed.
This uses computers.

2 Musicians record their music into a computer system.
This system is called a Musical Instrument Digital Interface (MIDI).

3 MIDI was developed as a standard interface.
MIDI is for linking music synthesisers and instruments together.

4 Computers can be connected to MIDI instruments.
These computers are fitted with MIDI interface boards.
This allows the music to be stored on computer.
This allows the music to be displayed on the monitor.
The music is being played.

5 The music can be displayed as a musical score.
The music can be edited.
This uses all the features of a mixing desk.

6 The music can also be printed out from the computer.
The music is being played.

7 MIDI doesn't transmit any sound.
It transmits simple binary information.

8 The information is called a MIDI message.
The message encodes sound as 8-bit bytes of digital information.

9 The most common messages consist of instructions.
These instructions tell the receiving instrument to play a note for a specific duration of time.

10 The instructions also contain details of how loud to play that note.
The instructions contain a number.
The number indicates which instrument to play.
Number 67 is a saxophone.

c) music players

questions to be asked and discussed

1) What music players do you know?
2) What features can a player have?

Writing

describe a perfect music player

SECTION 3 **images**

a) imaging

questions to be asked and discussed

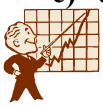
1) What is imaging?
2) What manipulations can you do when editing an image?
3) Bitmap
4) Raster and vector graphics
5) Image compression

b) graphics formats

questions to be asked and discussed

1) JPEG
2) GIF
3) PNG

c) 3-D images



report

3-D images
products for creating 3-D graphics

questions to be asked and discussed

1) 3-D imaging
2) products for creating 3-D images and objects
3) 3-D as a component of multimedia
4) languages for creating 3-D

SECTION 4 **Video**

a) MPEG group

report

MPEG group

questions to be asked and discussed

1) What do you know about MPEG group?
2) What does MPEG stand for?
3) What is the intent of MPEG?
4) What transmission rate does each modification of the MPEG have?
5) What MPEG standard has MP3 evolved from?
6) What is MPEG4?

report

MPEG 2

translation

Exercise 9

Render the article in English

MPEG-4: СТАНДАРТ ИНТЕРАКТИВНОГО ВИДЕО

Для тех, кто не в курсе, Moving Picture Experts Group (MPEG) — это рабочая группа, которая совместно с Международной организацией по стандартизации (International Standards Organization, ISO/IEC) трудится над стандартами кодирования цифрового аудио и видео. Она занимается созданием и внедрением нескольких аудио- и видеостандартов, включая алгоритмы компрессии, схемы обработки данных и инструментальные платформы. Больше всего эту группу знают, наверное, как разработчика схемы компрессии MPEG-1 Audio Layer 3 (MP3), но она создала и ряд других технологических стандартов, которыми мы, сами того не подозревая, ежедневно пользуемся, когда смотрим телевизор и работаем с компьютером.

MPEG движется поэтапно и к настоящему моменту выпустила стандарт хранения и воспроизведения видео и аудио MPEG-1; стандарт цифрового телевидения MPEG-2 и стандарт мультимедиа-приложений MPEG-4. В стадии разработки находится стандарт представления контента MPEG-7, включающий в себя «интерфейс описания мультимедийного контента».

Автор: Скотт Морган (Scott Morgan)(2006)

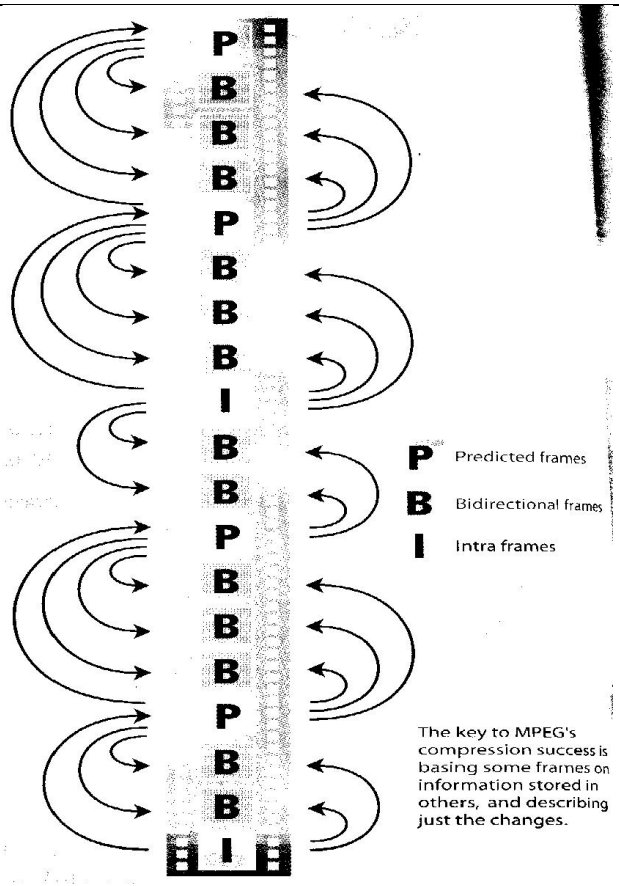
b) Video compression

reading

Exercise 10

Read the article and do exercises

THE TRICKS TO MPEG SUCCESS



The most common system for the compression of video is MPEG. It works like this. The single data stream off the CD-ROM is split into video and audio components, which are then decompressed using separate algorithms. The video is processed to produce individual frames as follows. Imagine a sequence of frames depicting a bouncing ball on a plain background. The very first is called an Intra Frame (I-frame). I-frames are compressed using only information in the picture itself just like conventional bitmap compression techniques like JPEG.

Following I-frames will be one or more predicted frames (P-frames). The difference between the P-frame and the I-frame it is based on is the only data that is stored for this P-frame. For example, in the case of a bouncing ball, the P picture is stored simply as a description of how the position of the ball has changed from the previous I-frame. This takes up a fraction of the space that would be used if you stored the P-frame as a picture in its own right. Shape or colour changes are also stored in the P-frame. The next P-frame may also be based on this P-frame and so on. Storing differences between the frames gives the massive reduction in the amount of information needed to reproduce the sequence. Only a few P-frames are allowed before a new I-frame is introduced into the sequence as a new reference point, since a small margin of error creeps in with each P-frame.

Between I and P-frames are bi-directional frames (B-frames), based on the nearest I or P-frames both before and after them. In our bouncing ball example, in a B-frame the picture is stored as the difference between the previous I or P-frame and the B-frame and as the difference between the B-frame and the following I or P-frame. To recreate the B-frame when playing back the sequence, the MPEG algorithm uses a combination of two references. There may be a number of B-frames between I or P-frames. No other frame is ever based on a B-frame so they don't propagate errors like P-frames.

Typically, you will have two or three Bs between Is or Ps, and perhaps three to five P-frames between Is.

1 Into what two components is the data stream split?
2 What information does an Intra frame contain?
3 What is stored in the P-frames following an I-frame?
4 What is stored in a P-frame in the case of a bouncing ball?
5 What gives the massive reduction in the amount of information needed to reproduce a video sequence?
6 Why is a new I-frame used after a few P-frames?
7 What is stored in a B-frame?
8 Why do B-frames not propagate errors?

1 Mark the following statements as True or False:

a JPEG is the most common compression system used for video.
b P-frames only store the changes in the image.
c There is always at least one P-frame between two I-frames.
d B-frames store the complete picture information.
e There can only be one B-frame between each I and P-frame.
f There are typically about four P-frames between each I-frame.

2 Match the words in Table A with the statements in Table B.

Table A

a Algorithm
b I-frame
c JPEG
d P-frame
e B-frame
f MPEG

Table B

i A common type of compression used for video data
ii A compressed video frame known as a predicted frame
iii A compressed video frame that stores changes between the frame before it and the frame after it.
iv A formula used for decompressing components of a data stream
v A type of compression used for bitmap images
vi A compressed video frame that contains the complete image information

SECTION 5 **revision**

group work

Dialogue:

- a student is asking an expert about key features of multimedia
- Two friends discussing their PC music players
- Two friends are to make a multimedia presentation. They discuss how they are going to do that.

Project

- analyze any multimedia file or application
- create your own multimedia project

NETWORKS

SECTION 1 **Introduction**

questions to be asked and discussed

1) What do we use networks for?
2) Logical and physical setup.
3) What is the difference between 'connection' and 'session'?
4) What can any network be characterized by?

report

Network Interface Cards
Modems

SECTION 2 **Configuration**

questions to be asked and discussed

1) What is a node?
2) What does a network consist of? What is its topology or general configuration?

report

Servers
Thin server and thin client

questions to be asked and discussed

1) What is a server?
2) What services does a server provide?
3) What is a client?

questions to be asked and discussed

1) What is a backbone?
2) What kinds of backbones do you know?

reading

Exercise 1

In general, a hub is the central part of a wheel where the spokes come together. The term is familiar to frequent fliers who travel through airport "hubs" to make connecting flights from one point to another. In data communications, a hub is a place of convergence where data arrives from one or more directions and is forwarded out in one or more other directions. A hub usually includes a switch of some kind. (And a product that is called a "switch" could usually be considered a hub as well.) The distinction seems to be that the hub is the place where data comes together and the switch is what determines how and where data is forwarded from the place where data comes together. Regarded in its switching aspects, a hub can also include a router.

In describing network topologies, a hub topology consists of a backbone (main circuit) to which a number of outgoing lines can be attached ("dropped"), each providing one or more connection port for device to attach to. For Internet users not connected to a local area network, this is the general topology used by your access provider. Other common network topologies are the bus network and the ring network. (Either of these could possibly feed into a hub network, using a bridge.)

As a network product, a hub may include a group of modem cards for dial-in users, a gateway card for connections to a local area network (for example, an Ethernet or a Token Ring), and a connection to a line (the main line in this example).

In telecommunication networks, a bridge is a product that connects a local area network (LAN) to another local area network that uses the same protocol (for example, Ethernet or Token Ring). You can envision a bridge as being a device that decides whether a message from you to someone else is going to the local area network in your building or to someone on the local area network in the building across the street. A bridge examines each message on a LAN, "passing" those known to be within the same LAN, and forwarding those known to be on the other interconnected LAN (or LANs).

In bridging networks, computer or node addresses have no specific relationship to location. For this reason, messages are sent out to every address on the network and accepted only by the intended destination node. Bridges learn which addresses are on which network and develop a *learning table* so that subsequent messages can be forwarded to the right network.

Bridging networks are generally always interconnected local area networks since broadcasting every message to all possible destinations would flood a larger network with unnecessary traffic. For this reason, router networks such as the Internet use a scheme that assigns addresses to nodes so that a message or packet can be forwarded only in one general direction rather than forwarded in all directions.

A bridge works at the data-link (physical network) level of a network, copying a data frame from one network to the next network along the communications path.

A bridge is sometimes combined with a router in a product called a brouter.

In packet-switched networks such as the Internet, a router is a device or, in some cases, software in a computer, that determines the next network point to which a packet should be forwarded toward its destination. The router is connected to at least two networks and decides which way to send each information packet based on its current understanding of the state of the networks it is connected to. A router is located at any gateway (where one network meets another), including each point-of-presence on the Internet. A router is often included as part of a network switch.

A router may create or maintain a table of the available routes and their conditions and use this information along with distance and cost algorithms to determine the best route for a given packet. Typically, a packet may travel through a number of network points with routers before arriving at its destination. Routing is a function associated with the

Network layer (layer 3) in the standard model of network programming, the Open Systems Interconnection (OSI) model. A layer-3 switch is a switch that can perform routing functions.

An edge router is a router that interfaces with an asynchronous transfer mode (ATM) network. A brouter is a network bridge combined with a router.

For home and business computer users who have high-speed Internet connections such as cable, satellite, or DSL, a router can act as a hardware firewall. This is true even if the home or business has only one computer. Many engineers believe that the use of a router provides better protection against hacking than a software firewall, because no computer Internet Protocol address are directly exposed to the Internet. This makes port scans (a technique for exploring weaknesses) essentially impossible. In addition, a router does not consume computer resources as a software firewall does. Commercially manufactured routers are easy to install, reasonably priced, and available for hard-wired or wireless networks.

A gateway is a network point that acts as an entrance to another network. On the Internet, a node or stopping point can be either a gateway node or a host (end-point) node. Both the computers of Internet users and the computers that serve pages to users are host nodes. The computers that control traffic within your company's network or at your local Internet service provider (ISP) are gateway nodes.

In the network for an enterprise, a computer server acting as a gateway node is often also acting as a proxy server and a firewall server. A gateway is often associated with both a router, which knows where to direct a given packet of data that arrives at the gateway, and a switch, which furnishes the actual path in and out of the gateway for a given packet.


questions to be asked and discussed

1) What are a bridge, hub, router, gateway used for?
2) What is the difference between them?

SECTION 3 **Data transmission**


report

twisted pair cabling
coaxial cabling
fiber-optic cabling
infrared connection
narrowband radio transmission


questions to be asked and discussed

1) What can data be transmitted via according to the type of connection?
2) What cable connections do you know?
3) What are advantages and disadvantages of the three cable categories?
4) What networks can use wireless connection?
5) What are the two common techniques for wireless transmission?

group work

EXERCISE 2

study the table and make a dialogue about the use of the three categories of network cables

Cable categories	**Use if**	**Do not use if**
Twisted-pair	You want a relatively easy installation in which computer connections are simple.	Your LAN requires a high level of signal shielding to protect it from electromagnetic waves that may interfere with the electrical signal carried in the cable. You must transmit data over long distances at high speeds.
Coaxial	You need to transmit data for greater distances that is possible with less expensive cabling.	You need to change the network cables frequently due to relocations.
Fiber-optic	You need to transmit secure data at very high speeds over long distances.	You have a small budget. You do not have the expertise to properly install it and connect devices to it.

questions to be asked and discussed

1) What is bandwidth? What is data transfer rate?
2) What is bandwidth measured in? And data transfer rate?
3) What is full-duplex data transmission? Half-duplex one?
4) What is the difference between synchronous and asynchronous transmission?
5) What is a packet?

Exercise 3
Read the text and do exercises

A **Find the answers to these questions in the following text.**

1 Into what units is data subdivided by the following layers?
   a transport layer
   b network layer
2 What is the purpose of a transmission checksum test?
3 How long does the data-link layer keep a copy of each packet?
4 What processes can be carried out at intermediate nodes?
5 Which network communications layer is described by each of the following statements?
   a Makes sure that the message is transmitted in a language that the receiving computer can understand
   b Protects the data being sent
   c Encodes and sends the packets
   d Supervises the transmission
   e The part of a communications process that a user sees
   f Starts communications and looks after communications among network nodes
   g Chooses a route for the message
   h Makes backup copies of the data if required
   i Confirms the checksum, then addresses and duplicates the packets

Network Communications

1 The application layer is the only part of a communications process that a user sees, and even then, the user doesn't see most of the work that the application does to prepare a message for sending over a network. The layer converts a message's data from human-readable form into bits and attaches a header identifying the sending and receiving computers.

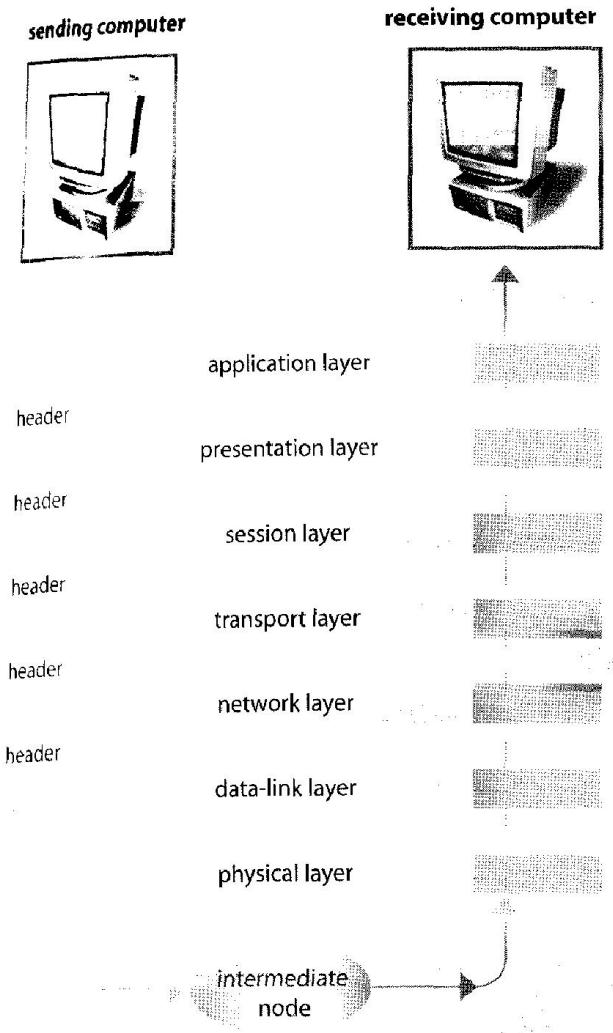
2 The presentation layer ensures that the message is transmitted in a language that the receiving computer can interpret (often ASCII). This layer translates the language, if necessary, and then compresses and perhaps encrypts the data. It adds another header specifying the language as well as the compression and encryption schemes.

3 The session layer opens communications and has the job of keeping straight the communications among all nodes on the network. It sets boundaries (called bracketing) for the beginning and end of the message, and establishes whether the messages will be sent half-duplex, with each computer taking turns sending and receiving, or full-duplex, with both computers sending and receiving at the same time. The details of these decisions are placed into a session header.

4 The transport layer protects the data being sent. It subdivides the data into segments, creates checksum tests – mathematical sums based on the contents of data – that can be used later to determine if the data was scrambled. It can also make backup copies of the data. The transport header identifies each segment's checksum and its position in the message.

5 The network layer selects a route for the message. It forms data into packets, counts them, and adds a header containing the sequence of packets and the address of the receiving computer.

6 The data-link layer supervises the transmission. It confirms the checksum, then addresses and duplicates the packets. This layer keeps a copy of each packet until it receives confirmation from the next point along the route that the packet has arrived undamaged.



7 The physical layer encodes the packets into the medium that will carry them – such as an analogue signal, if the message is going across a telephone line – and sends the packets along that medium.

8 An intermediate node calculates and verifies the checksum for each packet. It may also reroute the message to avoid congestion on the network.

9 At the receiving node, the layered process that sent the message on its way is reversed. The physical layer reconverts the message into bits. The data-link layer recalculates the checksum, confirms arrival, and logs in the packets. The network layer recounts incoming packets for security and billing purposes. The transport layer recalculates the checksum and reassembles the message segments. The session layer holds the parts of the message until the message is complete and sends it to the next layer. The presentation layer expands and decrypts the message. The application layer converts the bits into readable characters, and directs the data to the correct application.

B Re- to

1 Match the term in Table A with the statement in Table B.

Table A

a	Bracketing
b	Half-duplex
c	Full-duplex
d	Checksum

Table B

i	Transmission mode in which each computer takes turns sending and receiving
ii	Mathematical calculations based on the contents of data
iii	Set boundaries for the beginning and end of a message
iv	Transmission mode in which both computers send and receive at the same time

2 Mark the following statements as True or False:

a Most of the work that an application does to prepare a message for sending over a network is not seen by the user.
b ASCII is always used to transmit data.
c The encryption layer compresses the message.
d The network layer keeps track of how many packets are in each message.
e The network layer keeps a copy of each packet until it arrives at the next node undamaged.
f Analogue signals are used on ordinary telephone lines.
g When a message arrives at its destination, it passes through the same seven network communications layers as when it was sent, but in reverse order.

3 Identify which layer attaches the following headers to a network transmission:

a Specifying the language, the compression and encryption schemes
b Identifying each segment's checksum and its position in the message
c Containing the sequence of packets and the address of the receiving computer
d Marking the beginning and end of the message and specifying whether the messages will be sent half-duplex or full-duplex
e Identifying the sending and receiving computers

4 Fill in the missing words in the following sentences then put the sentences in the correct order:

a The checksum is recalculated by the ..... layer which also reassembles the message ..... .
b The message is ..... and ..... by the presentation layer.
c The message is reconverted into ..... by the physical layer.
d The session layer then sends the message to the next ..... .
e The application layer converts the bits into ..... characters, and directs the data to the correct ..... .
f The incoming ..... are recounted by the network layer for ..... and billing purposes.
g The ..... layer confirms the arrival of the packets, ... them in, and calculates the ..... for each packet.
h The parts of the message are ..... by the ..... layer until the message is ..... .

SECTION 4 **Topology**

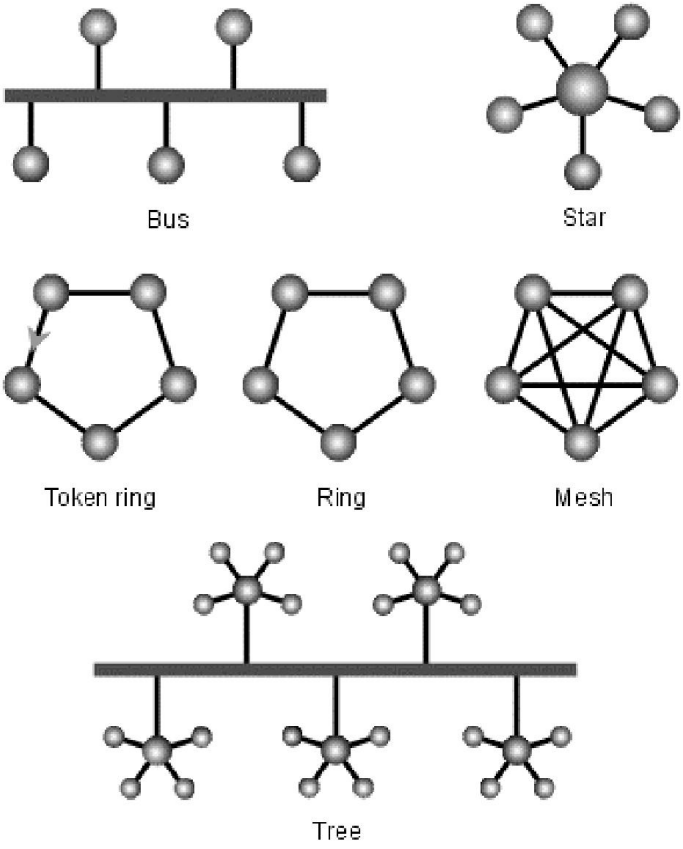
questions to be asked and discussed

1) What is topology?
2) What is the difference between the physical topology and the logical topology?
3) What layouts of physical topology can you imagine?
4) What are the advantages and disadvantages of each configuration?

writing

Exercise 4

label each picture with the type of the network it depicts. Write a report on advantages and disadvantages of each topology



report

token ring topology

group work

Exercise 5

arrange the steps how Token Ring works in the logic order

A Token Ring network is a local area network (LAN) in which all computers are connected in a ring or star topology and a bit- or token-passing scheme is used in order to prevent the collision of data between two computers that want to send messages at the same time. The Token Ring protocol is the second most widely-used protocol on local area networks after Ethernet. The IBM Token Ring protocol led to a standard version, specified as IEEE 802.5. Both protocols are used and are very similar. The IEEE 802.5 Token Ring technology provides for data transfer rates of either 4 or 16 megabits per second. Very briefly, here is how it works:

1. The frame is examined by each successive workstation. If the workstation sees that it is the destination for the message, it copies the message from the frame and changes the token back to 0.
2. When the frame gets back to the originator, it sees that the token has been changed to 0 and that the message has been copied and received. It removes the message from the frame.
3. When a computer has a message to send, it inserts a token in an empty frame (this may consist of simply changing a 0 to a 1 in the token bit part of the frame) and inserts a message and a destination identifier in the frame.
4. The frame continues to circulate as an "empty" frame, ready to be taken by a workstation when it has a message to send.
5. Empty information frames are continuously circulated on the ring.

questions to be asked and discussed

What relationship can there be among different workstations within a network?

report

relationship of nodes (master/slave, client/server, peer-to-peer network)

SECTION 5 **networks**

questions to be asked and discussed

1) What is PAN?
2) What is control network? Give examples.

report

Ethernet
Intranet
Extranet

reading

Exercise 6

Read the text and summarize it.

A home network is two or more computers interconnected to form a local area network (LAN) within the home. In the United States, for example, it is estimated that 15 million homes have more than one computer. A home network allows computer owners to interconnect multiple computers so that each can share files, programs, printers, other peripheral devices, and Internet access with other computers, reducing the need for redundant equipment and, in general, making everything easier to use. For example, if you have an older computer without a CD-ROM, you can access your newer computer's CD-ROM instead of purchasing one for your older computer. Sharing files across a home network is also easier than copying a file to a floppy and running to the other computer to use the file. A new trend, sometimes referred to as an intelligent network, extends the home network to include controls for the home ambient environment, security systems, and kitchen devices. In general, a home network is distinguished from a small office-home office (SOHO) network only by its more general purpose and possibly by the kinds of devices that are interconnected.

Before deciding what kind of home network you want, you must ask yourself if it bothers you to drill holes and run wire throughout your house? Do you mind opening your computer and installing network cards? Are your computers in the same room? What is your budget for a home network? Do you mind paying someone to come in and do the setup for you?

There are five types of home networks, two that use wire connections and three that use wireless connections:

- Direct cable connection: This allows you to connect both computers with a $10 null modem that plugs into both computers' serial, parallel, or Universal Serial Bus port. You simply configure the Windows 9x/NT Direct Cable Connection feature and you're ready to go. You lose your printer's parallel port if

you use a parallel port connection. USB is faster than both serial and parallel, but you must make sure you are using Windows 95B or Windows 98 when using a USB network. This is a possible choice when two computers are in the same room.

- Traditional Ethernet: A peer-to-peer Ethernet network requires installing network interface cards (NIC) inside each computer and interconnecting them with a coaxial cable or a twisted pair cable. You have to install driver and configure Windows 9x/NT. The drawback to an Ethernet network is the difficulty of hardware installation. Will your computers recognize the new cards? If your computers have several cards installed already, you might run into hardware conflicts. This type of network is suitable for use with two to twelve computers. You can have your computers scattered throughout your house, but you will have to wire each room that has a computer. Beginning cost of an Ethernet network is $100.
- AC network: An AC (alternating current) network is a possibility when computers are in different locations in your house. You don't need to drill any holes or wire any rooms. You simply plug one end of an adapter into the parallel port of your computer and plug the other end into an outlet. You do the same for each computer. Your data is transmitted through the power lines. You can have a ready-made network anywhere in the house at any time. When purchasing the equipment and software for your AC network, make sure it includes extra outlet strips and an adapter for your printer. The software setup can be difficult for AC networks. The cost of an AC network is $200 for two computers.
- Phoneline network This type of wireless network was developed by the Home Phoneline Networking Alliance (HomePNA) to offer an easy and inexpensive (starting at $150 for two computers) solution that uses existing phone lines. For example, Action Tec's ActionLink Home Networking Kit provides PCI card that share a single registered jack with your modem and telephone. The HomePNA technology is designed to not interfere with your voice and data transmissions. This means that you can talk on the phone and use your Internet connection at the same time without any noticeable decrease in modem speed. A phoneline network does require you to install PCI cards and software drivers. The data transfer rate of a phoneline network is 10 Mbps.
- Radio Free (RF) network: This type of wireless network uses radio frequency (RF) waves to transmit through walls and floors up to 800 feet. The only hardware is a special card inserted into each computer or a transceiver plugged into each computer's parallel port. If you purchase an RF network that uses transceivers, make sure equipment is included for connecting your printer. The problem with an RF network is interference from other wireless communication devices. Some RF network packages promise no interference from other wireless devices. RF networks start at $100.

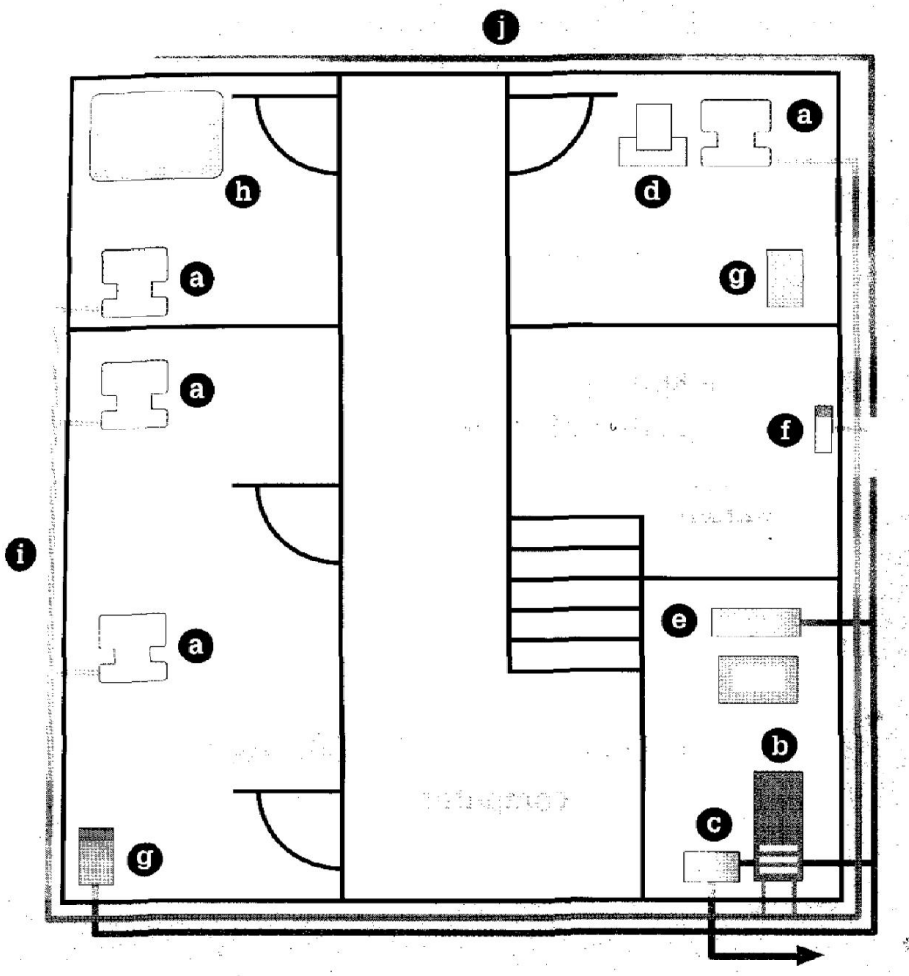
A number of companies offer approaches to an intelligent network in the home. For example, IBM is partnering with home developers to equip new houses with Home Director Model 200, which includes the distribution of video and satellite connections throughout your house, using your DVD player in the living room to watch a movie in your bedroom, automatically turning on and off your lights, and lowering your thermostat at night.

reading

Exercise 7

Read the text and match the diagram key to the components of the network

The technology needed to set up a home network is here today. It is just a matter of connecting a number of PCs equipped with Ethernet adapters to a hub using twisted-pair cabling which uses sockets rather like phone sockets. Special isolation adapters can be fitted to allow existing mains lines to be used instead of twisted-pair cabling. Most future home networks, however, are likely to be wireless network systems, using tuned transmitter and receiver devices. The simplest networks allow basic file-sharing and multi-player gaming as well as sharing of peripherals such as printers. Most advanced home networks are likely to have a client/server structure, with low-cost terminals, or 'thin' clients, connected to a central server which maintains the system's storage capacity and, depending on whether the terminals are dumb or processor-equipped network computers, its processing power. To make the most of such a network, it must become part of an integrated home entertainment and control system. To the user, the desktop becomes just one of many features accessible throughout the house. Tired of working in the study? Pop down to the living room and reload it into the terminal there. Before you start work, call up the hi-fi control program and have the music of your choice pumped through the living room speakers. Computer and entertainment networks can be separate but linked by the server to allow control of the latter from the terminals. Future home networks are more likely to have the entire system based on a single loop.



KEY TO THE DIAGRAM

1. **Line receiver delivering home entertainment audio to speakers within the room.**
2. **TV set relaying digital TV broadcasts relayed from the receiver by the home entertainment system.**
3. **Network modem allowing clients to access the Internet simultanously. Ideally this would be replaced by an ISDN adapter or DSL modem fitted inside the server.**
4. **Thin client comprising a display, keyboard, mouse, floppy and CD-ROM drive. If the client is NetPC-based, it will have its own processor and memory. A dumb terminal will simply act as an interface to the real computer, the server.**
5. **Network printer connected to any client.**
6. **Line driver connected to the home entertainment system: the cable TV player, DVD player, etc.**
7. **Home server. It contains roughly 5Gb of storage per terminal and one or more processors, depending on whether it is connected to network computers or to cheaper dumb terminals.**
8. **Entertainment system delivery network. This also hooks up to the server to control the system and receive digital audio and video from it.**
9. **Entertainment network control pad. While the system can be controlled by a PC, there would be one of these per connected room to ensure that the client does not need to be activated to use the system.**
10. **Data line linking clients to server.**

questions to be asked and discussed

1) LANs, WANs, CANs, MANs, VANs

SECTION 6 **Revision**

Exercise 8

With the help of the diagram, try to describe the function of these components of a typical network system.

1 a file server
2 a bridge
3 a router
4 a backbone
5 a LAN
6 a gateway
7 a modem

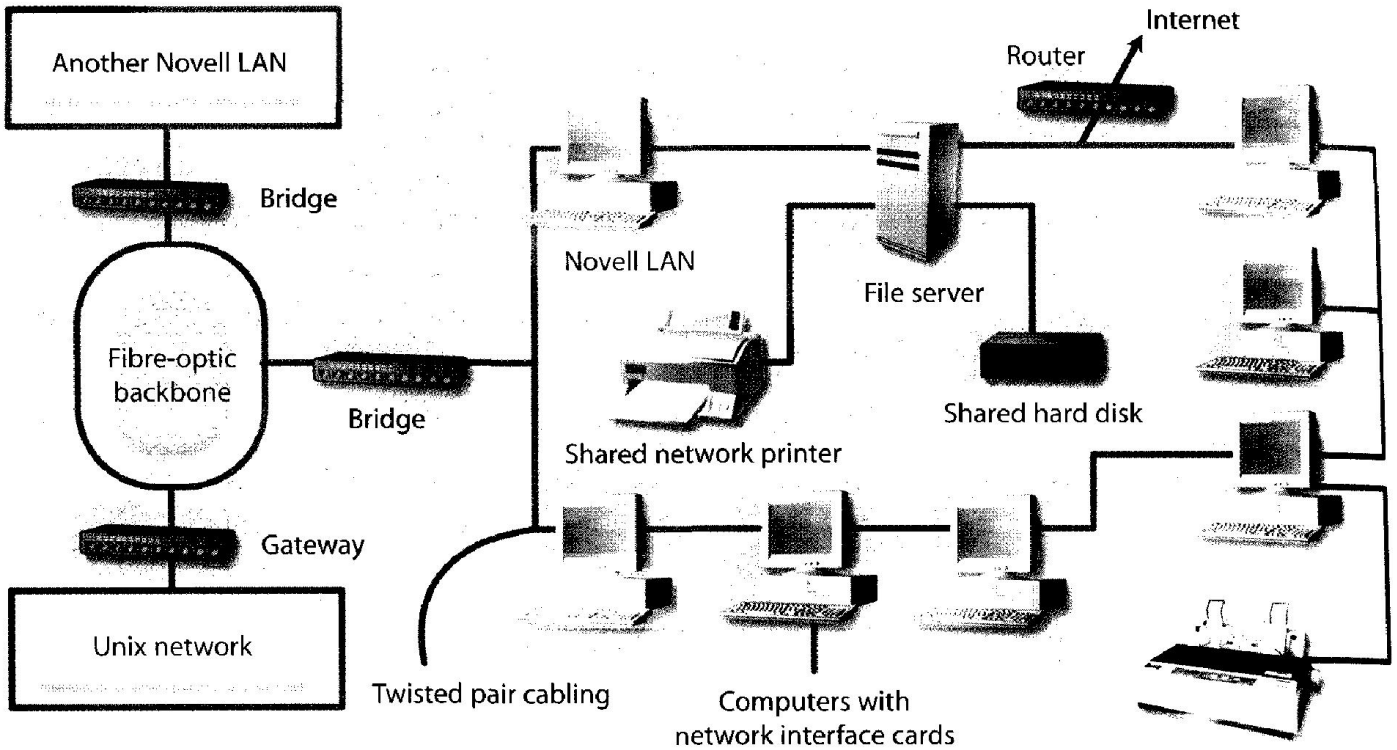


Fig 1

group work

Exercise 9

Work in groups. One group lists advantages of networks. The other group lists disadvantages of networks. Then together decide how the disadvantages can be minimized.